IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Shunpei Yamazaki, et al.	Art Unit	: 2823
Serial No.	: 08/994,038	Examiner	: W. David Coleman
Filed	: December 18, 1997	Conf. No.	: 6059
Title	: CHARGE TRANSFER SEMICONDUCTOR DEVICE AND MANUFACTURING METHOD THEREOF		

Mail Stop Appeal Brief - Patents
Commissioner for Patents
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REPLY BRIEF

Pursuant to 37 C.F.R. § 41.41, appellant responds to three points raised for the first time in the Examiner's Answer as follows.

First, at the paragraph bridging pages 8 and 9, the Examiner acknowledges that Inoue does not teach having the crystal growth direction coincide with the charge transfer direction, and then goes on to argue that Inoue does teach that the material can be polycrystalline silicon or single crystalline silicon, and that this somehow renders appellant's argument moot. As best understood, the Examiner's argument appears to be that all polycrystalline and single crystal semiconductor materials will grow in vertical and horizontal directions, that charge will necessarily be limited by grain boundaries, that all polycrystalline or single crystalline silicon materials will necessarily satisfy the claim limitations, and that appellant has failed to show why the material as claimed is different from that of the prior art.

Appellant strongly disagrees with the Examiner's position, as appellant's claims recite specific structure that is not inherent in all polycrystalline or single crystalline materials. Initially, appellant notes that single crystal materials are not relevant to the claims, which recite films "having a plurality of crystals." Nor are the recited features inherent in all polycrystalline materials. For example, claim 2 recites that (1) "at least one of the vertical and horizontal charge coupled devices comprises a crystalline semiconductor film having a plurality of crystals extending in a crystal growth direction," (2) "a crystal structure of the crystalline semiconductor film in the crystal growth direction is continuous so that a charge moving is not restricted by a grain boundary," and (3) "at least one of the vertical and horizontal charge coupled devices that has the crystalline semiconductor film is arranged such that a charge transfer direction of the at

least one of the vertical and horizontal charge coupled devices is coincident with the crystal growth direction." Thus, the claim recites that (1) the crystals extend in a crystal growth direction, (2) the crystals are continuous in that direction (i.e., there are no grain boundaries in that direction), and (3) at least one of the charge coupled devices is arranged such that the charge transfer direction is coincident with the crystal growth direction.

The Examiner appears to take the position that "crystal growth direction" is a meaningless term that may be ignored and may be read to mean any direction. This interpretation ignores the meaning of this term that is well known to those of skill in the art and that is set forth in the application. For example, discussions of crystal growth direction are provided in the application at page 3, lines 10-24 with reference to Fig. 3C, and at page 5, line 27 to page 6, line 12, and show that the crystal growth direction is the primary direction in which the crystals grow. Neither Inoue nor Okada show an arrangement in which crystals are continuous in such a crystal growth direction that is coincident with a charge transfer direction. For example, Figs. 84(a)-84(g) of Okada, which are cited in the Examiner's Answer as showing a crystalline semiconductor film 905 having crystals in a crystal growth direction, shows crystals growing in vertical columns (see Fig. 84(d) and col. 61, lines 39-44), while the charge transfer direction across the transistor channel would be horizontal (see Fig. 84(g)).

Moreover, even assuming for sake of argument that one could select some arbitrary direction to be the crystal growth direction, the cited references do not describe or suggest an arrangement in which crystals are continuous in a crystal growth direction that is coincident with the charge transfer direction. For example, if one were to arbitrarily say that the crystal growth direction in Okada's Figs. 84(a) to 84(g) is horizontal and coincident with the charge transfer direction through the transistor channel of Fig. 84(g), the crystals are not continuous in that direction and moving charges would be restricted by grain boundaries in that direction (see Fig. 84(d)).

Second, at the paragraph bridging pages 9 and 10, the Examiner mischaracterizes appellant's arguments to be that the claims are allowable solely for reciting that the crystal structure is continuous in the crystal growth direction. Appellant has not taken that position and,

instead, has argued that the claims are allowable due to a failure of the cited art to recite the combination of features discussed above.

Third, at the first full paragraph of page 10, the Examiner mischaracterizes appellant's arguments to be that the claims are allowable because Okada is silent as to the term "CCD" and notes that Okada was not relied upon as showing a CCD. Appellant has not taken that position and, instead, has argued (1) that the office action improperly asserted that Okada describes a charge transfer direction of a CCD, when, in fact, Okada is silent as to that feature, and (2) that there would have been no motivation to apply the structures described by Okada to the CCD of Inoue because, since Okada provides no mention of CCDs, Okada provides no indication that the structures would be useful in such devices. As to point (1), appellant notes that the Examiner's Answer repeats this mischaracterization of Okada at page 4, lines 14-16. As to point (2), appellant notes that the Examiner's Answer once again fails to address this lack of motivation.

For these reasons, and the reasons stated in the Appeal Brief, appellant submits that the final rejection should be reversed.

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Respectfully submitted,

Date: 6/21/06

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